



INSTITUT TEKNOLOGI SEPULUH NOPEMBER
FAKULTAS TEKNOLOGI INDUSTRI DAN REKAYASA SISTEM
DEPARTEMEN TEKNIK FISIKA
LABORATORIUM MATERIAL FUNGSIONAL MAJU
Ruang E103 – Gedung P, Kampus ITS Keputih Sukolilo, 60111, Surabaya

HASIL PENGUJIAN KETAHANAN API ISOLATOR TUBE TEMBAGA
Nomor: 05/05/E/LMFM/2022

I. Dasar Pengujian

Permohonan pengujian ketahanan api sampel isolator tube tembaga per tanggal 30 Maret 2022



II. Sediaan (Sampel) Pengujian

Sampel material diterima adalah tubing tembaga terisolasi bermerek Zutto Black untuk aplikasi AC.

III. Pelaksanaan Pengujian

Pengujian ketahanan api (uji pembakaran) dilakukan di Laboratorium Material Fungsional Maju, Departemen Teknik Fisika.

IV. Parameter Pengujian

Parameter pengujian meliputi ketahanan api untuk material isolator tube tembaga.

V. Metodologi Pengujian

Pengujian laju pembakaran material isolator tube tembaga dilakukan berdasarkan prosedur standar ASTM D635 – 83 *Standard Test Method for Rate of Burning and/or Extent and Time of Burning Plastics in a Horizontal Position*.

VI. Evaluasi Hasil Pengujian

Daya tahan api diindikasikan dengan laju linier pembakaran material isolator sesuai ASTM D635 – 83. Laju linier pembakaran material isolator rata-rata adalah 100.125 mm/min. Nilai laju pembakaran ini masuk dalam kategori “**slow burning (HB)**” dalam UL 94 Classification and Flame-Retardant Thermoplastic.



INSTITUT TEKNOLOGI SEPULUH NOPEMBER
FAKULTAS TEKNOLOGI INDUSTRI DAN REKAYASA SISTEM
DEPARTEMEN TEKNIK FISIKA
LABORATORIUM MATERIAL FUNGSIONAL MAJU

Ruang E103 – Gedung P, Kampus ITS Keputih Sukolilo, 60111, Surabaya

Surabaya, 25 Mei 2022

Menyetujui,

Kepala Laboratorium Material Fungsional Maju

Dr.-Ing Doty Dewi Risanti, S.T., M.T.

NIP. 197409031998022001



INSTITUT TEKNOLOGI SEPULUH NOPEMBER
FAKULTAS TEKNOLOGI INDUSTRI DAN REKAYASA SISTEM
DEPARTEMEN TEKNIK FISIKA
LABORATORIUM MATERIAL FUNGSIONAL MAJU
Ruang E103 – Gedung P, Kampus ITS Keputih Sukolilo, 60111, Surabaya

LAMPIRAN PENGUJIAN
Nomor: 05.A/05/E/LMFM/2022

Berikut ini adalah worksheet pengujian laju terbakarnya isolator tube tembaga berdasarkan ASTM D635 – 83

RATE OF BURNING AND/OR EXTENT AND TIME OF BURNING OF PLASTICS IN A HORIZONTAL POSITION
TEST RESULT

- 1. Material Identification— Include generic description, manufacturer, commercial designation, lot number, and color**
3 layered plastic tube (with respective color from outer part of black, white, and black) generally for insulating material.
- 2. The thickness, as measured with a micrometer to the nearest 0.1 mm**
Mentioned in table below.
- 3. The nominal apparent density (rigid cellular materials only).**
-
- 4. The direction of any anisotropy relative to the test specimen dimensions.**
- 5. Conditioning treatment**
Materials were tested on a laboratory atmosphere of X°C and X% relative humidity.
- 6. Any prior treatment before testing, other than cutting, trimming and conditioning.**
No prior treatment were done before testing.
- 7. Whether or not the specimen continued to burn (with or without visible flame) after application of test flame.**
All specimens continued to burn after application of test flame.
- 8. Whether or not the flame front reached the 25 and 100 mm reference marks**
The flame front reached the 25 and 100mm reference marks during every test.
- 9. For specimens with which the flame front does not reach or pass the 25 mm reference mark, a statement that indicates the flame front did not reach or pass the 25 mm reference mark. Do not report an elapsed time (t) and burned length (L).**
-Unnecessary (Flame front pass the 25mm mark)
- 10. For specimens with which the flame front passed the 25 mm reference mark but did not reach the 100 mm reference mark, the elapsed time (t) and burned length (L).**
-Unnecessary



INSTITUT TEKNOLOGI SEPULUH NOPEMBER
FAKULTAS TEKNOLOGI INDUSTRI DAN REKAYASA SISTEM
DEPARTEMEN TEKNIK FISIKA
LABORATORIUM MATERIAL FUNGSIONAL MAJU

Ruang E103 – Gedung P, Kampus ITS Keputih Sukolilo, 60111, Surabaya

11. If a specimen does not burn to the 100 mm mark because of dripping, flowing, or falling burning particles, the report must so indicate.

-Unnecessary (Specimen burnt to the 100mm mark)

12. If a specimen is reignited by burning material on the gauze, the report must so state.

-Unnecessary (Specimen wasn't reignited by burning material)

13. For specimens with which the flame front reached the 100 mm reference mark, the average linear burning rate, (V).

From the conducted test, the average linear burning rate were obtained as follows

Specimen No.	Specimen Thickness (cm)	Time to burn until 100mm marks (sec)	Average Linear Burning Rate (V) (mm/min)
1	0.7	60	100
2	0.8	48	125
3	0.7	85	70.58824
4	0.9	53	113.2075
5	0.7	95	63.15789
6	0.6	50	120
7	0.9	46	130.4348
8	0.7	60	100
9	0.8	55	109.0909
10	0.7	86	69.76744
		63.8	100.1247

14. Whether the flexible specimen support fixture was used.

No flexible specimen support fixture was used during the testing.

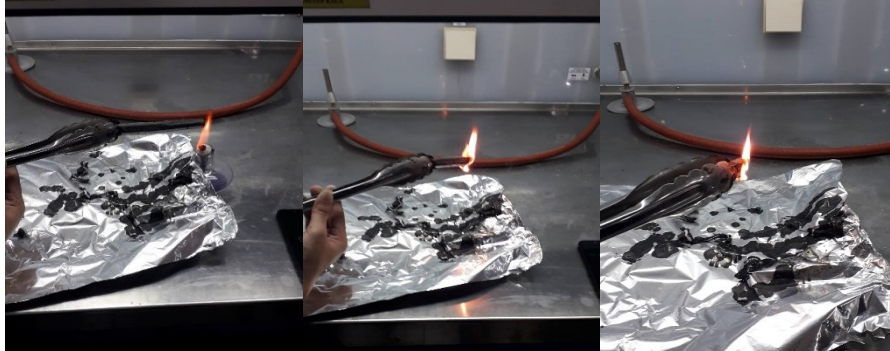
15. The caveat contained in 1.4 herein shall be incorporated in its entirety in the test report issued.

This standard is used to measure and describe the response of materials, products, or assemblies to heat and flame under controlled conditions, but does not by itself incorporate all factors required for fire hazards or fire risk assessment of materials, products, or assemblies under actual fire conditions

16. Optional—Flame classification as determined from the appendix



INSTITUT TEKNOLOGI SEPULUH NOPEMBER
FAKULTAS TEKNOLOGI INDUSTRI DAN REKAYASA SISTEM
DEPARTEMEN TEKNIK FISIKA
LABORATORIUM MATERIAL FUNGSIONAL MAJU
Ruang E103 – Gedung P, Kampus ITS Keputih Sukolilo, 60111, Surabaya



Gambar L8. Dokumentasi uji laju bakar sampel isolator tube tembaga.